

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 11-340635

(43)Date of publication of application : 10.12.1999

(51)Int.Cl.

H05K 3/46
H05K 1/16

(21)Application number : 11-128761

(71)Applicant : TOSHIBA CHEM CORP
HOKURIKU ELECTRIC IND CO
LTD

(22)Date of filing : 10.05.1999

(72)Inventor : FUKUKAWA HIROSHI
KASAHARA HIROMI
SHINKAWA SAKAE
WAKABAYASHI AKINAO

(54) MULTILAYER PRINTED WIRING BOARD HAVING BUILT-IN ELECTRONIC CIRCUIT

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a multilayer printed wiring board having small changes in resistance and superior heat resistance.

SOLUTION: A multilayer printed wiring board having a built-in printed resistor has a conductive pattern and a printed resistor on the surface of a glass epoxy printed substrate, and the printed resistor is provided with an inner layer plate overcoated with epoxy base resin and an outer layer plate integrally laminated on the inner layer plate. The printed resistor includes resin contained in the substrate and conductive filler and is trimmed by a laser to produce a predetermined resistance.

LEGAL STATUS

[Date of request for examination] 08.06.1999

[Date of sending the examiner's decision of rejection] 07.01.2003

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's
decision of rejection]

[Date of requesting appeal against examiner's
decision of rejection]

[Date of extinction of right]

Copyright (C); 1998,2003 Japan Patent Office

*** NOTICES ***

JPO and NCIPI are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

TECHNICAL FIELD

[Field of the Invention] This invention has little resistance change, and it is related with the multilayer printed wiring board excellent in thermal resistance with built-in printing resistance.

[Translation done.]

*** NOTICES ***

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention has little resistance change, and it is related with the multilayer printed wiring board excellent in thermal resistance with built-in printing resistance.

[0002]

[Description of the Prior Art] From the former, in order to achieve thin shape-ization of a multilayer printed wiring board, forming a resistor between the conductor patterns of the inner strake of a multilayer printed wiring board is known.

[0003] The approach of vapor-depositing or galvanizing the metal used as a resistor, and forming a resistor with a photographic method on the inner strake in which the conductor pattern was formed, as an approach of forming a resistor between the conductor patterns of the inner strake of such a multilayer printed wiring board, and the approach of screen-stenciling carbon paste etc. between conductor patterns are learned.

[0004]

[Problem(s) to be Solved by the Invention] However, the approach of vapor-depositing or galvanizing the metal used as a resistor had the problem from which the price of an ingredient becomes expensive, and the approach by screen-stencil had the large resistance value change by the heating application of pressure at the time of the heat at the time of surface treatment (melanism), or shaping, and it had the problem that the damage to a base material became large, by having performed trimming in order to amend resistance to the set point.

[0005] Furthermore, after screen-stenciling and carrying out surface preparation of the carbon paste etc., the technique which gives an overcoat with phenol system resin and makes small resistance change at the time of surface preparation was also known, but when an overcoat was carried out by phenol system resin, there was a problem of being inferior to thermal resistance.

[0006] This invention coped with this conventional difficulty, and was made, it can manufacture at cheap ingredient cost with screen printing, and since there is little process change of resistance, resistance can be adjusted in the phase of a inner layer substrate, therefore the trimming after completion is unnecessary and it aims at offering the multilayer printed wiring board with built-in printing resistance which was moreover excellent in thermal resistance.

[0007]

[Means for Solving the Problem] The multilayer printed wiring board with built-in printing resistance of this invention The inner strake with which it has a conductor pattern and printing resistance on a glass epoxy printed circuit board front face, respectively, and the overcoat by epoxy system resin was given on said printing resistance, On said overcoat of this inner strake, have the outside strake by which the laminating was carried out to one, and it changes. It is characterized by carrying out trimming of said printing resistance to predetermined resistance by laser, including respectively the resin contained in said glass epoxy printed circuit board or this resin, affinitive heat-resistant-good hardenability resin, and a conductive filler.

[0008] In this invention, a paper nonwoven fabric, the nonwoven fabric of a glass fiber, the nonwoven fabric of an aramid fiber, paper / aramid fiber nonwoven fabric, glass fiber textile fabrics, aramid fiber textile fabrics, the textile fabrics of a carbon fiber, or a nonwoven fabric can be mentioned as a base material of the prepreg which constitutes a substrate, for example.

[0009] Moreover, as impregnating resin of prepreg, an epoxy resin and hardenability resin excellent in thermal resistance like polyimide resin can be mentioned, for example. Desirable inner layer substrates are a GARASU epoxy group plate and a GARASU polyimide substrate.

[0010] The carbon paste used for formation of printing resistance in this invention is obtained by distributing and dissolving for example, a conductive filler into a little solvent with hardenability resin. At this time, a non-conductive filler can also be blended if needed.

[0011] The powder of a graphite like carbon black like furnace black, channel black, lamp black, thermal black, acetylene black, and KETCHIEN black, artificial-graphite powder, and natural-graphite powder as the above-mentioned conductive filler can be mentioned.

[0012] Moreover, there are an organic substance filler and an inorganic substance filler as non-conductive filler blended if needed.

[0013] For each of these fillers, mean particle diameter is several 10 micrometers. It is desirable that it is the following. As a former organic substance filler, the powder of a benzoguanamine resin hardened material, polymethacrylate powder, polyethylene powder, and polystyrene powder can be mentioned, for example.

[0014] Moreover, as an inorganic substance filler, colloid silica powder, dissolution silica powder, alumina powder, talc, mica powder, ferrous-oxide powder, calcium-carbonate powder, magnesium-carbonate powder, a bentonite, a dolomite, a kaolin, etc. can be mentioned, for example.

[0015] As a solvent used for carbon paste, retarder thinner like a ketone system, an ester system, an ether system, and an alcoholic system is desirable, for example, can mention butyl-cellosolve acetate, butyl carbitol acetate, an isophorone, a TEREPINE toll, etc.

[0016] Furthermore, as hardenability resin used for this carbon paste, the resin for substrates or the resin for substrates, and the good resin of affinitive thermal resistance are suitable.

[0017] The blending ratio of coal of each [these] component is suitably defined experimentally in consideration of the viscosity to which the printing resistance which should be formed was suitable for target resistance and printing.

[0018] The overcoat in this invention carries out the operation which holds to stability the resistance of the printing resistance formed in the inner strake in heating when incorporating an inner strake and manufacturing a multilayer printed wiring board, and the process of application of pressure.

[0019] As resin of the paste used for an overcoat, good epoxy system resin adhesive [with the resin and the resin for inner strakes which were used for conductive resin, such as a novolak mold epoxy resin, the bisphenol A mold epoxy resin, phenol novolak mold epoxy resins, or these mixed resin, for example], and heat-resistant is suitable.

[0020] this invention -- setting -- first -- subTORAKUTO -- a predetermined inner layer conductor pattern is formed in the inner layer substrate which consists of for example, a GARASU epoxy group plate, a GARASU polyimide substrate, etc. by well-known approach like law. subsequently, a printing resistance pattern is formed in the predetermined part of this inner layer conductor pattern with screen printing using the carbon paste mentioned above -- after calcinating at the temperature of 200 or less degrees C, resistance is measured, laser etc. performs trimming and it is set as predetermined resistance.

[0021] Thus, an overcoat is printed with the epoxy system resin mentioned above on the formed printing resistance.

[0022] prepreg homogeneous as the prepreg used for the inner strake after performing surface treatment (melanism processing) to the inner strake in which printing resistance and an overcoat were formed -- minding -- outer layer copper foil -- superposition and below 100 Torr -- desirable -- the bottom of reduced pressure of 60 or less Torrs -- and 50 kgf/cm² the following -- desirable -- 40 kgf/cm² Heating pressing is carried out to one with low voltage.

[0023] An outer layer circuit pattern, a through hole hole, etc. are formed by approaches, such as after an

appropriate time, for example, tenting etc., and printing resistance is formed in this outer layer circuit pattern if needed by the same approach as printing resistance of a inner layer circuit pattern.

[0024] Thus, especially the manufactured multilayer printed wiring board with built-in printing resistance is used for the multilayer printed wiring board corresponding to the impedance control which built in the matching resistance at the time of high-speed component loading in the electronic equipment application of which a miniaturization is required in the noncommercial electronics device fields which make the start a laptop type word processor, a personal computer, and a land mobile radiotelephone, such as a portable type transmitter and camera integral video, or the industrial device field.

[0025] It is small, and since an overcoat is given and surface treatment is performed on the printing resistance on a inner layer circuit plate in this invention, the resistance change at the time of surface treatment piles up prepreg and outer layer copper foil on this inner strake, and is under the reduced pressure below 100 Torr, and they are 50 kgf/cm². Generating of a void is controlled while the resistance value change at the time of the heating pressing of a multilayer printed wiring board becomes small, since heating pressing is carried out to one with the following low voltage. Furthermore thermal resistance also improves and thin shape-ization of a multilayer printed wiring board is attained. Furthermore, since epoxy system resin is used as resin of an overcoat, it excels also in thermal resistance.

[0026]

[Embodiment of the Invention] The operation gestalt of this invention is explained below.

[0027] A predetermined inner layer circuit pattern is formed in both sides of an example glass epoxy multilayer printed wiring board (TLC-551M) [the trade name by Toshiba Chemical CORP.] with a conventional method, printing resistance of 30- 500 kohm is further formed by screen-stencil using carbon paste (electric resistance coating given in JP,55-18459,A it is unstated to application of Hokuriku Electric Industry Co., Ltd.), and it is a maximum temperature. It calcinated at 200 degrees C. Next, on this, the overcoat was printed by the epoxy system resin FC hardware C-463 (Shikoku formation shrine trade name), and surface treatment (melanism processing) was performed. Then, it is glass epoxy prepreg (TLP-551) to both sides. It is under reduced pressure of superposition and 30Torr about [the trade name by Toshiba Chemical CORP.], and copper foil, and they are 40 kgf/cm². In a pressure, it is 125 at 170 **. Part heating application of pressure was carried out, it fabricated to one, the multilayer printed board was obtained, the outer layer circuit and the through hole hole were formed, and the multilayer printed wiring board was manufactured.

[0028] Except for the point which did not print an overcoat, the multilayer printed wiring board was manufactured by the same approach as the approach of an example after example of comparison 1 printing resistance.

[0029] Except for the point which used unsaturated-polyester-resin Byron (trade name by Toyobo Co., Ltd.) as example of comparison 2 overcoat material, the multilayer printed wiring board was manufactured by the same approach as the approach of an example.

[0030] the moulding pressure after using unsaturated-polyester-resin Byron (trade name by Toyobo Co., Ltd.) as example of comparison 3 overcoat material and piling up glass epoxy prepreg and copper foil -- 55 kgf/cm² ** -- except for the point carried out, the multilayer printed wiring board was manufactured by the same approach as the approach of an example.

[0031] It was as follows when the property of the multilayer printed wiring board obtained in the above example and each example of a comparison was measured.

[0032]

[A table 1]

	実施例	比較例		
		1	2	3
抵抗値の工程変化	◎	△	◎	△
耐熱性	○	◎	△	○

ただし、◎：-3～+3%

○：-5～+5%

△：-8～+20%

[0033]

[Effect of the Invention] According to this invention, there is little resistance change which builds in the resistance formed by simple screen printing, and the multilayer printed wiring board excellent in thermal resistance with built-in printing resistance can be obtained so that clearly also from the above example.

[0034]

[Translation done.]

*** NOTICES ***

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

EFFECT OF THE INVENTION

[Effect of the Invention] According to this invention, there is little resistance change which builds in the resistance formed by simple screen printing, and the multilayer printed wiring board excellent in thermal resistance with built-in printing resistance can be obtained so that clearly also from the above example.

[Translation done.]

*** NOTICES ***

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

PRIOR ART

[Description of the Prior Art] From the former, in order to achieve thin shape-ization of a multilayer printed wiring board, forming a resistor between the conductor patterns of the inner strake of a multilayer printed wiring board is known.

[0003] The approach of vapor-depositing or galvanizing the metal used as a resistor, and forming a resistor with a photographic method on the inner strake in which the conductor pattern was formed, as an approach of forming a resistor between the conductor patterns of the inner strake of such a multilayer printed wiring board, and the approach of screen-stenciling carbon paste etc. between conductor patterns are learned.

[Translation done.]

*** NOTICES ***

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, the approach of vapor-depositing or galvanizing the metal used as a resistor had the problem from which the price of an ingredient becomes expensive, and the approach by screen-stencil had the large resistance value change by the heating application of pressure at the time of the heat at the time of surface treatment (melanism), or shaping, and it had the problem that the damage to a base material became large, by having performed trimming in order to amend resistance to the set point.

[0005] Furthermore, after screen-stenciling and carrying out surface preparation of the carbon paste etc., the technique which gives an overcoat with phenol system resin and makes small resistance change at the time of surface preparation was also known, but when an overcoat was carried out by phenol system resin, there was a problem of being inferior to thermal resistance.

[0006] This invention coped with this conventional difficulty, and was made, it can manufacture at cheap ingredient cost with screen printing, and since there is little process change of resistance, resistance can be adjusted in the phase of a inner layer substrate, therefore the trimming after completion is unnecessary and it aims at offering the multilayer printed wiring board with built-in printing resistance which was moreover excellent in thermal resistance.

[Translation done.]

*** NOTICES ***

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

MEANS

[Means for Solving the Problem] The multilayer printed wiring board with built-in printing resistance of this invention The inner strake with which it has a conductor pattern and printing resistance on a glass epoxy printed circuit board front face, respectively, and the overcoat by epoxy system resin was given on said printing resistance, On said overcoat of this inner strake, have the outside strake by which the laminating was carried out to one, and it changes. It is characterized by carrying out trimming of said printing resistance to predetermined resistance by laser, including respectively the resin contained in said glass epoxy printed circuit board or this resin, affinitive heat-resistant good hardenability resin, and a conductive filler.

[0008] In this invention, a paper nonwoven fabric, the nonwoven fabric of a glass fiber, the nonwoven fabric of an aramid fiber, paper / aramid fiber nonwoven fabric, glass fiber textile fabrics, aramid fiber textile fabrics, the textile fabrics of a carbon fiber, or a nonwoven fabric can be mentioned as a base material of the prepreg which constitutes a substrate, for example.

[0009] Moreover, as impregnating resin of prepreg, an epoxy resin and hardenability resin excellent in thermal resistance like polyimide resin can be mentioned, for example. Desirable inner layer substrates are a GARASU epoxy group plate and a GARASU polyimide substrate.

[0010] The carbon paste used for formation of printing resistance in this invention is obtained by distributing and dissolving for example, a conductive filler into a little solvent with hardenability resin. At this time, a non-conductive filler can also be blended if needed.

[0011] The powder of a graphite like carbon black like furnace black, channel black, lamp black, thermal black, acetylene black, and KETCHIEN black, artificial-graphite powder, and natural-graphite powder as the above-mentioned conductive filler can be mentioned.

[0012] Moreover, there are an organic substance filler and an inorganic substance filler as non-conductive filler blended if needed.

[0013] For each of these fillers, mean particle diameter is several 10 micrometers. It is desirable that it is the following. As a former organic substance filler, the powder of a benzoguanamine resin hardened material, polymethacrylate powder, polyethylene powder, and polystyrene powder can be mentioned, for example.

*** NOTICES ***

JPO and NCIPI are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] The inner strake with which it has a conductor pattern and printing resistance on a glass epoxy printed circuit board front face, respectively, and the overcoat by epoxy system resin was given on said printing resistance, On said overcoat of this inner strake, have the outside strake by which the laminating was carried out to one, and it changes. Said printing resistance contains the resin contained in said glass epoxy printed circuit board or this resin, affinitive heat-resistant good hardenability resin, and a conductive filler, respectively. And the multilayer printed wiring board with built-in printing resistance characterized by carrying out trimming to predetermined resistance by laser.

[Translation done.]